

# Eastern Pacific Expeditions of the New York Zoological Society. XLIV. Non-intertidal Brachygnathous Crabs from the West Coast of Tropical America. Part 1: Brachygnatha Oxyrhyncha<sup>1</sup>

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(Plate I; Text-figures 1 & 2)

[This is the forty-fourth of a series of papers dealing with the collections of the Eastern Pacific Expeditions of the New York Zoological Society made under the direction of William Beebe. The present paper is concerned with specimens taken on the Templeton Crocker Expedition (1936) and the Eastern Pacific "Zaca" Expedition (1937-1938). For data on localities, dates, dredges, etc., refer to *Zoologica*, Vol. XXII, No. 2, pp. 33-46, and Vol. XXIII, No. 14, pp. 287-298.]

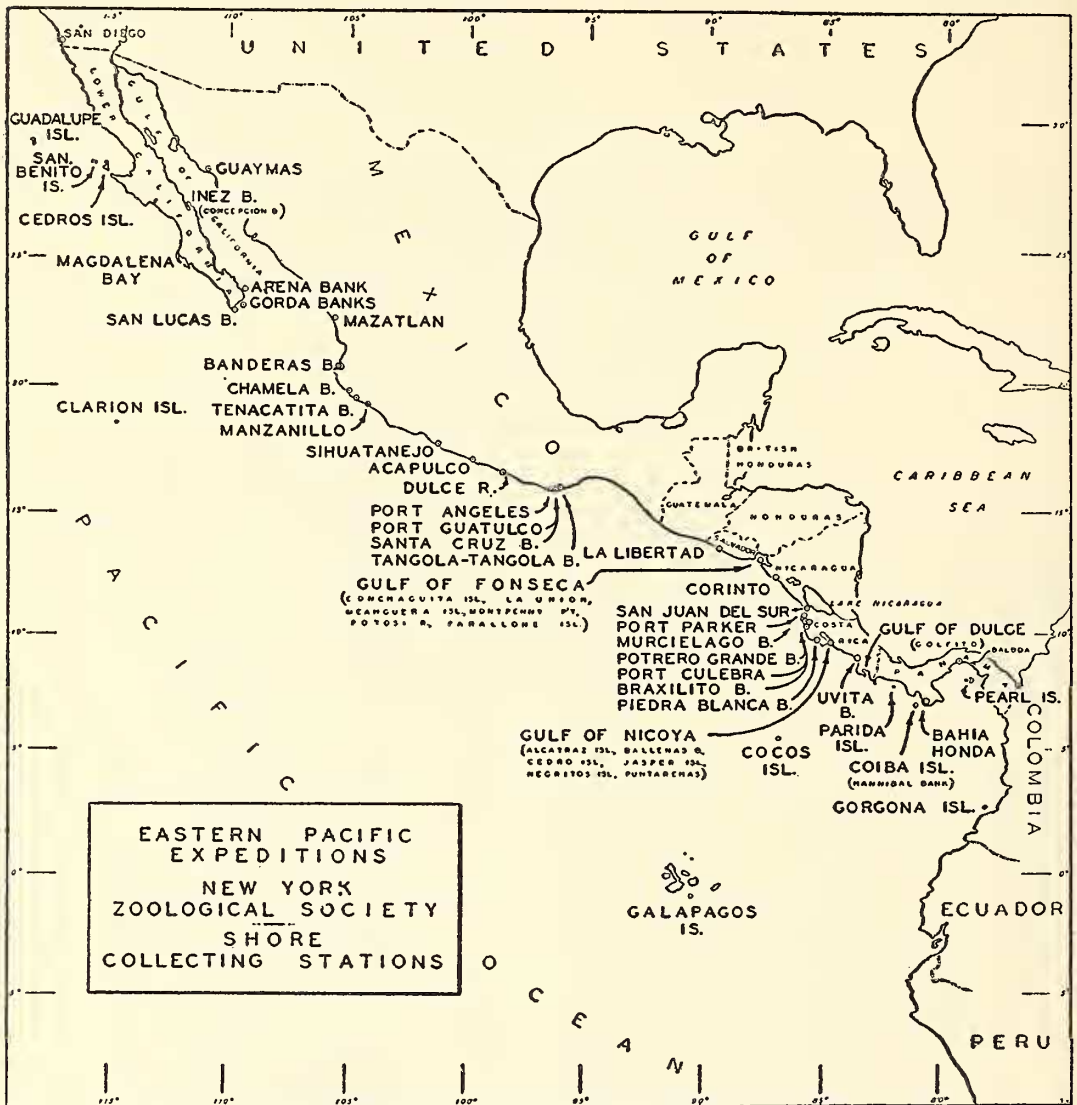
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## INTRODUCTION

THE present study was undertaken as one of a series of reports, each devoted to the efforts of a single expedition covering an extensive but exclusive sector of the Pacific American coastline. The earliest was that of the

<sup>1</sup>Contribution No. 993, Department of Tropical Research, New York Zoological Society.



TEXT-FIG. 1. Shore collecting stations of the Eastern Pacific Expeditions of the New York Zoological Society. For exact locations of associated dredge stations, refer to *Zoologica*, vol. XXII, no 2, and vol. XXIII, no. 14.

"Zaca," under the direction of Dr. William Beebe, which in 1937 and 1938 covered the southwestern portion of North America from San Diego, California, to Balboa, Canal Zone. (See Text-fig. 1). The intertidal brachygnathous crabs of this expedition were reported on by Crane (1947). The second was that of the "Askoy" under the direction of Dr. Robert Cushman Murphy, which in 1941 covered the northwest corner of South America from Panama to Cape Santa Elena, Ecuador (Garth, 1948). The third was that of the Lund University Chile Expedition, under the direction of Professor Dr. Hans Brattström and Dr. Erik

Dahl, which in 1947 and 1948 covered the southwestern portion of South America from Paita, Peru, to the Strait of Magellan (Garth, 1957). Each of the above reports, the present included, is regarded as contributing toward a series of monographs based principally but not exclusively upon the collections of the "Velero III," which from 1931 to 1941, under the direction of Capt. Allan Hancock, made annual cruises extending as far southward as San Juan Bay, Peru.

At the time of reporting on the intertidal brachygnathous crabs from the west coast of tropical America, Crane (*op. cit.*, p. 70) speci-

fically excluded "all the Portunidae, Goneplacidae, and Pinnotheridae, in spite of the fact that species of these families were occasionally taken in tidepools, coral, or in high-tide seines; the Gecarcinidae, although they occur on the fringes of both beach and mangrove areas; several *Sesarma* which proved as typically fresh-water as the Potamonidae, although they also occurred in the upper reaches of tidal streams; and all *Plagusia*, which, although rarely found in tidepools, are characteristically oceanic." The excluded families and genera, plus the dredged Majidae, Parthenopidae, Xanthidae and Grapsidae, the shore-collected members of which were included in the above-mentioned report, therefore become the subject matter of the report that follows. Since the total number of species of Brachygnatha collected other than intertidally is quite large, it has been decided to treat the Oxyrhyncha and the Brachyrhyncha in separate installments. The non-brachygnathous Dromiacea and Oxystomata will form the basis for a subsequent paper.

#### ECOLOGICAL CONSIDERATIONS

Since the report on the intertidal brachygnaths emphasized the ecological and behavioristic aspects, in the observation and interpretation of which Miss Crane is without a peer among present-day carcinologists, it is only fitting that the present report on non-intertidal forms deal with these aspects also. Fortunately, the writer has been provided by Miss Crane with an extensive set of notes on color, food habits and behavior, on which he has drawn freely. It is regrettable that dredged forms are not as accessible to direct observation (or were not, before the advent of the aqua-lung) as are the intertidal forms, so that much of their ecology must be arrived at by indirect methods.

From the fact that single collections were made by shallow dredging of species normally collected in intertidal zones 3, 4 and 5 (See Crane, 1947, p. 86), namely, stones near low-tide level, tidepools and *Pocillopora* coral, it may be inferred that these biotopes extend into the subtidal or adtidal zone, lacking only the factor of exposure to air, which in the case of the lowest low-tide level may be for but a few hours each year. And from the record of the bottom types sampled it is apparent that all the basic substrata, sand, mud, gravel and rock present in the intertidal are present in the subtidal also. To cite but one example of an intertidal biotope having a subtidal extension: the mud banks of the mangrove flat not only dip below the low-tide line, but the muddy bottoms of the mangrove-fringed lagoons and esteros are covered with plant detritus that in some cases represents an almost

pure culture of decaying mangrove leaves. Since multiple bottom types are often included in the same dredge haul, often with organic additions, such as shell, coral, coralline or weed, it is possible only through comparing many dredge hauls and by a process of elimination to determine the particular bottom type or types on which a given species of crab normally occurs.

A special word about the *Pocillopora* colony is needed, since Crane (*op. cit.*, p. 88), although admitting that its usual depth was from one to three or more fathoms, chose to treat it as an intertidal habitat. Exposure of beds of living coral to air, according to the writer's experience, occurs along the coastline under consideration infrequently and for periods of brief duration only, as at spring tides. At other times coral heads are obtained by grappling or diving in water of moderate depth. While the nine species mentioned by Crane (*op. cit.*, p. 89) as apparent obligate symbiotes would presumably occur in living *Pocillopora* at whatever depth it might be found, it is reasonable to suppose that the non-obligates, *i. e.*, the twelve species found by Crane in other strictly intertidal habitats, might show the vertical zonation of these other habitats, and that a new group of non-obligates might invade the *Pocillopora* below tidal levels. That this is in fact the case is suggested in the accounts of the individual species to follow. (See especially *Herbstia camptacantha* and *H. pubescens*).

#### GEOGRAPHICAL CONSIDERATIONS

The territory explored by the "Zaca" on its 1937-1938 cruise represents but the northern and better-known half of the Panamic faunal province, which extends from Pta. Eugenia (or Pta. Entrada, *cf.* Garth, 1955), Lower California, to Pta. Santa Elena, Ecuador. It is therefore not to be expected that the number of range extensions, and particularly those southward, would approach those of the "Askoy" (Garth, 1948), which explored the lesser-known southern half in 1941. However, of those species of spider crabs heretofore believed limited to the Gulf of California, a southward range extension can be reported for *Collodes tumidus* to Manzanillo, Mexico, while of those species not earlier found north of Panama a northward extension may be noted for *Pitho quinqueidentata* to northern Costa Rica and for *Collodes robsonae* to El Salvador. *Collodes tenuirostris* was collected at or near the northern limit of its range east of Cedros Island, Lower California, the northernmost locality from which specimens in this collection were obtained.

In addition to these range extensions, many intermediate localities are noted that bridge large gaps in formerly discontinuous ranges. Among



these may be mentioned a Manzanillo record for *Macrocoeloma maccullochae* that links the previously reported localities of Isabel Island, Gulf of California, and Playa Blanca, Costa Rica. The record of *Maiopsis panamensis* from Hannibal Bank is the first from the Bay of Panama since the type, although the species has been taken subsequently at Manta, Ecuador, and Clarion Island, Mexico (Garth, 1958). The inclusion of dredged material from Clarion Island collected by the "Zaca" on the 1936 Templeton Crocker Expedition does not alter the faunal list for that outpost of the Revilla Gigedo group.

None of the species of Oxyrhyncha here recorded from the west coast of Central America occurs on the east coast as well; however, numerous species of both Majidae and Parthenopidae occur on both sides of the continent as species pairs (Rathbun, 1925; Garth, 1958).

Attention has been focused on the decapod crustacean fauna of El Salvador by recent papers by Holthuis (1954) and by Bott (1955). The following species collected by the "Zaca" may be listed as new to that country: *Collodes granosus*, *C. robsonae*, *Notolopas lamellatus* and *Heterocrypta craneae*. Similarly, *Parthenope* (*Parthenope*) *hyponca* may be reported as new to Nicaragua, although the decapod crustacean fauna of that country has been comparatively better known because of the early activities of J. A. McNeil (Smith, 1871).

#### SYSTEMATIC CONSIDERATIONS

The 44 species of Oxyrhyncha treated in Part 1 equals the 44 species of Brachyrhyncha to be treated in Part 2 of this paper and represents over 32 per cent. of the 135 species of Oxyrhyncha occurring on the Pacific American coast from Bering Strait to the Strait of Magellan, including the Galapagos Islands (Garth, 1958). The 35 species of Majidae represent 30 per cent. of the 118 species, the 9 species of Parthenopidae 56 per cent. of the 16 species, known to comprise the Pacific American fauna in these families. The larger percentage of parthenopids represented in the present collection reflects the more exclusively tropical distribution of that family, plus the fact that more species of Majidae than of Parthenopidae are intertidal, and so were earlier reported by Crane (1947).

Because the new species obtained by the "Velero III" from this same coastline were earlier described, in most cases as rapidly as studied (Garth, 1940, 1958), there are few novelties remaining in the present collection. However, the first male and second known specimen of *Collodes robsonae* Garth (1958) is reported and the male first pleopod figured in these pages (Text-fig. 2), while a species of *Heterocrypta* of

large size, but unfortunately represented by the female sex only, is described as new to science. An earlier record of Port Parker, Costa Rica, for *Macrocoeloma maccullochae* Garth (1940) is corrected to Playa Blanca, Costa Rica.

Although Boone (1938), on the basis of a single male specimen from Hannibal Bank, Panama, anticipated the writer in synonymizing *Stenocionops triangulata* (Rathbun) with *S. macdonaldi* (Rathbun), the former the young, the latter the adult of a species currently known as *S. ovata* (Bell), the 16 adolescent specimens obtained in a single dredge haul by the "Zaca" at Manzanillo, Mexico, including both sexes in a size range from 26 to 51 mm., provide convincing evidence in support of such action. Pertinent data are presented as Table I.

In order that systematists in other groups need not scan the entire paper for the limited information germane to their studies, it should be mentioned that rhizocephalan parasites are referred to in the account of *Notolopas lamellatus*, barnacles in the account of *Herbstia pubescens* and bryozoans in the description of *Heterocrypta craneae*.

#### RESTRICTION OF SYNONYMIES

In keeping with the format established in the "Askoy" Expedition report (Garth, 1948), synonymies are restricted to the original description, the first use of the name in its current combination, and the citation placing the species in the territory covered, if not included in the above two. For the preferred synonymy the reader is referred to Garth: "Brachyura of the Pacific Coast of America. Oxyrhyncha" (1958), to which the dredged Majidae and Parthenopidae reported herein must be considered as a supplement. For the convenience of those not possessing this work, reference is also made to the spider crab monograph of Rathbun (1925), and to all reported occurrences of species subsequent to this date in the eastern tropical Pacific.

#### MEASUREMENTS

The system of measurement used is that of Garth (1958, p. 27), which differs from that of Rathbun (1925, p. 1) in but one significant aspect: the length of the doubly rostrate species of spider crab is measured along the midline from the posterior border of the carapace to an imaginary perpendicular joining the rostral spines, thereby including the rostral length in the total length of both doubly rostrate and singly rostrate species.

#### ACKNOWLEDGMENTS

Gratitude is hereby expressed to Dr. William Beebe, Director Emeritus, and to Miss Jocelyn



Crane, Assistant Director, Department of Tropical Research, New York Zoological Society, for making the present collection available for study, and to Miss Crane in particular for supplying the notes on color, habit and habitat that raise the paper above the level of systematic routine and for answering promptly and cheerfully the many questions that arose as the work progressed. Appreciation also goes to the writer's associates at the Allan Hancock Foundation: to the late Dr. James W. Buchanan, who as Director of Research from 1950 to 1952 continued the earlier policy of Captain Allan Hancock of permitting staff members to devote time to collections complementing those of the "Velero III" to the enrichment of general knowledge; to Victoria Louise Smith and Janet Haig, who as Research Assistants helped with the cataloguing of the specimens; and to Dr. John D. Soule, who identified the bryozoan found on the new *Heterocrypta* species. Lastly, thanks are given to Dr. F. A. Chace, Jr., Curator of Marine Invertebrates, U. S. National Museum, for the loan of specimens of *Heterocrypta granulata* (Gibbes) for comparison.

#### SYSTEMATIC DISCUSSION

##### Tribe BRACHYURA

##### Subtribe BRACHYGNATHA

##### Superfamily OXYRHYNCHA

##### Family MAJIDAE

##### *Euprognatha bifida* Rathbun

*Euprognatha bifida* Rathbun, 1893, p. 231; 1925, p. 103, pl. 34, figs. 5, 6. Crane, 1937, p. 55. Garth, 1948, p. 22; 1958, p. 61, pl. B, fig. 8; pl. 3, fig. 3. *Batrachonotus nicholsi* Rathbun, 1894, p. 55; 1925, p. 127, pl. 39, figs. 5-8.

*Range*.—From San Benito Islands, Lower California, and Tepoca Bay, Gulf of California, Mexico, to Cape San Francisco, Ecuador. Socorro, Clarion and Cocos Islands. 0.5-90 fathoms. (Garth, 1958).

*Material Examined*.—Fourteen specimens from three stations:

##### Mexico

Clarion Island, 3 miles off Pyramid Rock, May 12, 1936, Station 163, D-2, 55 fathoms, 1 male; D-3, D-4, 50 fathoms, 1 male.

##### Costa Rica

Port Parker, January 20, 1938, Station 203, D-2, D-3, 10 fathoms, 7 males, 4 ovigerous females.

##### Panama

Bahia Honda, March 18, 1938, Station 222, D-4, 11 fathoms, 1 female.

*Measurements*.—Males, 5.2 to 8.0 mm., fe-

males, 4.5 to 5.8 mm. (ovigerous females, 5.4 to 5.8 mm.) in length.

*Habitat*.—Shelly sand, algae; dead coral, shells, gravelly mud.

*Breeding*.—Costa Rica in January.

*Remarks*.—In view of the reduction to synonymy of *Batrachonotus nicholsi* Rathbun (Garth, 1958, above), it is well to remark that the female from Bahia Honda and one of the females from Port Parker were of the type formerly referred to that genus and species.

##### *Collodes granosus* Stimpson

*Collodes granosus* Stimpson, 1860, p. 194, pl. 2, fig. 4. Rathbun, 1925, p. 106, pl. 36, figs. 1, 2; pl. 217, fig. 1. Garth, 1948, p. 23; 1958, p. 72, pl. E, fig. 2; pl. 3, fig. 5. Not Boone, 1930, p. 76, pl. 21, figs. A, B.

*Range*.—From near Punta Piaxtla, Sinaloa, Mexico, to Santa Elena Bay, Ecuador. 2-30 fathoms. (Garth, 1958)

*Material Examined*.—Ten specimens from five stations:

##### El Salvador

La Libertad, December 16, 1937, Station 198, D-1, 13 fathoms, 2 males; D-2, 14 fathoms, 1 male, 2 females.

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 1 female, ovigerous.

##### Costa Rica

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 8 fathoms, 1 mature female, 2 young females.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-5, D-6, 6 fathoms, 1 young female.

*Measurements*.—Males, 8.3 to 9.8 mm., females, 5.3 to 8.9 mm. (ovigerous female 8.5 mm.), young from 3.8 mm. in length.

*Habitat*.—Mud; sand, mud and crushed shell; mangrove leaves, mud, shells.

*Breeding*.—Gulf of Fonseca in late December.

*Remarks*.—The 3.8 mm. young are almost bare, while the 5.3 and 5.4 mm. females show the incipient granulation characteristic of the species.

##### *Collodes tenuirostris* Rathbun

*Collodes tenuirostris* Rathbun, 1893, p. 230; 1925, p. 113, pl. 37, text-fig. 35. Crane, 1937, p. 55. Garth, 1958, p. 74, pl. E, fig. 3; pl. 6, fig. 5.

*Range*.—From Cedros Island, west coast of Lower California, and Tepoca Bay, Gulf of California, Mexico, to Sechura Bay, Peru. 3-90 fathoms. (Garth, 1958). To 145 fathoms. (Rathbun, 1925)

**Material Examined.**—Eleven specimens from three stations:

#### Mexico

East of Cedros Island, November 10, 1937, Station 126, D-14, 45 fathoms, 1 ovigerous female.

Tangola-Tangola, December 9, 1937, Station 196, D-1, D-2, D-5, 5 fathoms, 1 young female.

#### Costa Rica

Off Ballenas Bay, Gulf of Nicoya, February 25, 1938, Station 213, D-15, 40 fathoms, 2 males; D-16, 45 fathoms, 4 males, 3 females (2 ovigerous).

**Measurements.**—Males, 14.1 to 27.5 mm., females, 13.3 to 27.4 mm. (ovigerous females, 18.0 to 27.4 mm.) in length. Since the larger of these specimens exceed the 26.2 mm. male and 21.5 mm. ovigerous female reported by Garth (1958), their measurements in mm. are given in tabular form for ease in comparison:

	Male	Female
Length of carapace .....	27.5	27.4
Width of carapace .....	22.4	22.3
Length of rostrum .....	2.2	2.1
Width of rostrum .....	2.0	1.9
Length of cheliped .....	31.2	26.6
Length of chela .....	13.8	11.2
Length of dactyl .....	7.5	6.2
Height of palm .....	4.3	2.5
Length of ambulatory legs		
First pair .....	53	50
Second pair .....	—	49
Third pair .....	46	45.5
Fourth pair .....	44	44

**Color in Life.**—Apparently coral pink. Completely covered, except mouth-parts, ventral side of rostrum, eye and chelae, with long, mucous-like wool of a greenish-gray mud color. Uncovered parts white spotted with chestnut; chelae entirely chestnut. Eggs bright coral red.

**Behavior.**—In four-by-four dish began picking off "fur," especially from frontal region, and began eating it. (Under microscope, covering looks exactly like dirty wool; when dry it is mud and glistening fibers. I am certain the whole is mucous and mud held on by hairs, which on ambulatories are very long). In aquarium, buried self in mud; just as active next morning when removed and put back in aquarium without mud. Movements, except those of chelipeds in picking off wool to eat, sluggish. (Crane, field notes).

**Habitat.**—Mud, algae; gravelly sand; mud.

**Breeding.**—West coast of Lower California in early November; Costa Rica in late February.

**Remarks.**—The Cedros Island record above at

least duplicates, and possibly extends slightly, the northernmost record for the species.

#### *Collodes tumidus* Rathbun

*Collodes tumidus* Rathbun, 1898, p. 569, pl. 41, fig. 1; 1925, p. 121, pl. 40, figs. 1, 2; pl. 218, fig. 5, text-fig. 47. Crane, 1937, p. 56. Garth, 1958, p. 77, pl. E, fig. 4; pl. 3, fig. 6.

**Range.**—West coast of Lower California from east side of Cedros Island to Magdalena Bay; Gulf of California from Puerto Refugio, Angel de la Guarda Island, to 1¼ miles SW of Cabeza Ballena. 11-70 fathoms.

**Material Examined.**—Manzanillo, Mexico, November 22, 1937, Station 184, D-2, 30 fathoms, 1 male, 4 ovigerous females.

**Measurements.**—Male, 11.5 mm., ovigerous females, 10.5 to 11.6 mm. × 9.6 mm.

**Habitat.**—Gravelly sand.

**Breeding.**—West coast of Mexico in late November.

**Remarks.**—As compared to *Collodes robsonae*, *C. tumidus* is a hairy species, the ovigerous females of small size. The 11.6 mm. ovigerous female is larger than the 10.8 mm. female noted by Garth (1958).

With all previous records from either the west coast of Lower California or the Gulf of California, the record above for Manzanillo is the first from Mexico south of Cape Corrientes.

#### *Collodes robsonae* Garth

(Text-fig. 2)

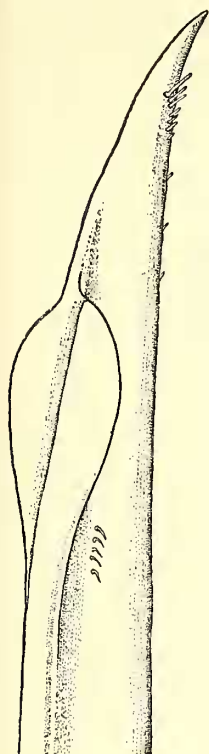
*Collodes robsonae* Garth, 1958, p. 78, pl. D, figs. 1-6; pl. 4, fig. 1.

**Range.**—Known only from the type locality, Venado, Canal Zone.

**Material Examined.**—Meanguera Island, Gulf of Fonseca, El Salvador, December 23, 1937, Station 199, D-1, 16 fathoms, 1 male.

**Measurements.**—Male specimen, length 26.0 mm., width 19.8 mm., rostrum 1.5 mm., width 2.0 mm., cheliped 26.8 mm., chela 11.0 mm., dactyl 6.8 mm., height of palm 3.1 mm., walking legs 46, 48.5, 44, and 38 mm., respectively.

**Description of Male.**—Differing from female as follows: Carapace lacking punctate linear striations but with corresponding inner branchial and outer intestinal regions blistered. Pits in grooves separating branchial from hepatic, gastric and cardiac regions deeper and more linear. Rostrum a little longer, extending well beyond outer antennal spine, sinus between horns V-shaped rather than U-shaped, interantennular spine visible in dorsal view. Cardiac and gastric spines longer but retaining their proportionate



TEXT-FIG. 2. *Collodes robsonae*, male, terminal portion of right first pleopod,  $\times 90$ . Jens W. Knudsen, del.

lengths of 2 to 3. Horizontal row of hairs replaced by two tufts on gastric region. Postlateral marginal ridge thickened but not raised.

Basal antennal article more granulate on margins, especially the external margin opposite base of eyestalk. Rostral, internal and external basal antennal spines or teeth enclosing antennules dorsally and laterally.

Male chelipeds feeble like those of female; fingers gaping slightly for basal two-fifths, denticulate and in contact for distal three-fifths.

Male abdomen lacking a spine or tubercle on first segment, segments 4, 5 and 6 each with a low, transverse, rectangular, hairy tubercle, greatest width opposite segment 3, succeeding segments laterally concave, segments 6-7 fused, segment 7 narrowly triangular. Two diagonal, rectangular, granulate and hairy tubercles on sternum at base of chelipeds.

Tip of male pleopod slender, acuminate, lateral lobe scarcely extending beyond margins of lip enclosing aperture.

**Color.**—Carapace and chelipeds pale buff; ambulatories and underparts pure white; hairs all buff.

**Habitat.**—Sand, mud, crushed shell.

**Behavior.**—Used mud and mucous exactly like *Collodes tenuirostris* (which see), except that it

did not attempt to pick them off. Does not bury self in mud at all. Movements sluggish. (Crane, field notes).

**Remarks.**—The Meanguera Island specimen is the only specimen of this species other than the type and is the first male to be recorded. Although it differs from the female in no essential other than the characters associated with its sex, these serve at once to affirm its affinities with other members of the genus *Collodes*, and to define its differences from them.

#### ***Paradasygyus depressus* (Bell)**

*Microrhynchus depressus* Bell, 1835a, p. 88; 1836, p. 42, pl. 8, figs. 2, 2d-f.

*Dasygyus depressus*, Rathbun, 1898, p. 570; 1925, p. 138, pl. 1; pl. 274, figs. 5-8. Boone, 1930, p. 78, pl. 22. Crane, 1937, p. 56. Garth, 1948, p. 24.

*Paradasygyus depressus*, Garth, 1958, p. 81, pl. E, fig. 5, pl. 4, fig. 2.

**Range.**—From Ensenada de San Francisco, mainland side, and outside Concepción Bay, Lower Californian side, Gulf of California, to Cape Corrientes, Colombia. 5-55 fathoms; exceptionally to 80 fathoms. (Garth, 1958).

**Material Examined.**—Seventeen specimens from four stations:

#### **Mexico**

Tenacatita Bay, November 21, 1937, Station 183, D-2, 30 fathoms, 1 female.

#### **Costa Rica**

Port Culebra, January 30, 1938, Station 206, D-1, 14 fathoms, 1 male.

Fourteen miles S  $\times$  E of Judas Point, March 1, 1938, Station 214, D-1, D-2, 42 fathoms, 7 males, 7 females.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-5, D-6; 6 fathoms, 1 male.

**Measurements.**—Males, 11.4 to 22.2 mm., females, 12.0 to 18.5 mm., and young from 4.1 mm. in length.

**Color in Life.**—See Crane (1937, p. 56).

**Habitat.**—Muddy sand; sandy mud; mud and shell; mangrove leaves.

**Remarks.**—The splendid series from 14 miles S  $\times$  E of Judas Point lacks ovigerous females, nor does it include specimens of the size of the 27.7 mm. male and 24.8 mm. female recorded by Garth (1958).

#### ***Pyromaia tuberculata* (Lockington)**

*Inachus tuberculatus* Lockington, 1877a, p. 30.

*Pyromaia tuberculata*, Rathbun, 1925, p. 133, pl. 40, fig. 3; pl. 218, figs. 1-4. Crane, 1937, p. 56. Ricketts & Calvin, 1939, p. 249. Garth, 1948, p. 23; 1958, p. 85, pl. E, fig. 7; pl. 6, fig. 1.



*Collodes granosus*, Boone, 1930, p. 76, pl. 21, figs.

A, B. Not *C. granosus* Stimpson.

**Range.**—From Tomales Bay, Marin County, California (extralimital), and from Monterey Bay, California, to off Cape Corrientes, Colombia, including the Gulf of California from Consag Rock south. Shore to 225 fathoms.

**Material Examined.**—Two specimens from two stations:

#### Costa Rica

Off Ballenas Bay, February 25, 1938, Station 213, D-16, 45 fathoms, 1 male.

#### Panama

Gulf of Chiriqui, March 13, 1938, Station 221, D-3, 35 fathoms, 1 male.

**Measurements.**—Larger specimen, male, length 14.9 mm., width 13.2 mm. Smaller specimen, male, length 13.8 mm., width 11.8 mm.

**Habitat.**—Mud; sandy mud.

**Remarks.**—The single male from the Bay of Panama is of the granulous variety described by Rathbun (1925, p. 136) as "Variety B." When a sufficient number of specimens from this area can be examined, it may be possible to segregate the Bay of Panama form as a subspecies, as has been done with specimens from the northern third of the Gulf of California, now known as *Pyromaia tuberculata mexicana* (Rathbun). No measurements of the Bay of Panama form are given by Garth (1958).

#### *Inachoides laevis* Stimpson

*Inachoides laevis* Stimpson, 1860, p. 192. Rathbun, 1925, p. 61, pl. 22, figs. 3-6 (exclusive of Atlantic material). Crane, 1937, p. 53. Garth, 1948, p. 22; 1958, p. 98, pl. E, fig. 6; pl. 6, fig. 4.

**Range.**—From Cedros Island and Scammon Lagoon, west coast of Lower California, and Rocky Point, Gulf of California, Mexico, to La Libertad, Ecuador. 1.5 to 56 fathoms.

**Material Examined.**—Nineteen specimens from five stations:

#### Mexico

Port Guatulco, December 6, 1937, Station 195, D-14, 4 fathoms, 1 young female.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5 fathoms, 1 female; December 12, 1937, D-14, D-15, 12 fathoms, 1 ovigerous female.

#### Nicaragua

Corinto, Station 200, December 29, 1937, D-5, 2 fathoms, 2 ovigerous females; January 5, 1938, D-14, D-15, 1 fathom, 2 males; January 7, 1938, D-27 to D-30, 3 fathoms, 1 male.

#### Costa Rica

Port Parker, January 22, 1938, Station 203, D-4, 7 fathoms, 4 males, 2 females; D-6, 1 fathom, 1 ovigerous female.

Gulf of Dulce, March 9, 1938, Station 218, D-5, D-6, 6-4 fathoms, 4 males.

**Measurements.**—Males, 3.8 to 6.8 mm., females, 3.9 to 5.3 mm. (ovigerous females 4.0 to 5.3 mm.) in length.

**Habitat.**—Gravel, algae; mangrove leaves; crushed shell, rocks.

**Breeding.**—Mexico and Nicaragua in December, Costa Rica in late January.

**Remarks.**—Of small size and with a single rostral spine, this species is readily confused with both *Podochela veleronis* Garth and *Collodes tenuirostris* Rathbun. When mature males are present, as at the Costa Rican station above, the disproportionately large chelipeds with their characteristically gaping fingers make positive identification simpler.

A forthcoming report on the Caribbean collections of the "Velero III" will clarify the relationship of the Atlantic material grouped by Rathbun (1925) with Pacific under Stimpson's species.

#### *Podochela hemphilli* (Lockington)

*Microrhynchus hemphillii* Lockington, 1877a, p. 30. *Podochela hemphillii*, Rathbun, 1898, p. 569; 1925, p. 49, pl. 18; pl. 209, fig. 2. Crane, 1937, p. 51. *Podochela hemphilli*, Garth, 1958, p. 104, pl. H, fig. 6; pl. 7.

**Range.**—From Monterey Bay, California, and Angel de la Guarda Island, Gulf of California, Mexico, to Cabita Bay, Colombia. Clarion Island; Cocos Island. Shore to 55 fathoms (exceptionally to 90 fathoms). Rarely encountered south of the Gulf of California.

**Material Examined.**—Twenty-six specimens from two stations:

#### Mexico

SE of Cedros Island, November 10, 1937, Station 126, D-19, 25 fathoms, 1 ovigerous female.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 14 males, 11 females (10 ovigerous).

**Measurements.**—Males, 6.9 to 21.1 mm., females, 9.8 to 15.0 mm. (ovigerous females, 10.9 to 15.0 mm.) in length.

**Habitat.**—Rocks, algae; gravelly sand.

**Breeding.**—West coast of Lower California and west Mexico in November.

**Remarks.**—Although the species has been re-

ported (Garth, 1958) from Panama and even from Colombia, these records are based on admittedly inadequate material, occurrences outside of the Gulf of California to the southward being rare. It is therefore gratifying to find an established, breeding colony in Manzanillo harbor.

***Podochela angulata* Finnegan**

*Podochela angulata* Finnegan, 1931, p. 617, text-fig. 3. Garth, 1948, p. 21; 1958, p. 108, pl. F, figs. 1-6; pl. H, fig. 3; pl. 8, fig. 6.

**Range.**—From Puerto Culebra, Costa Rica, to La Libertad, Ecuador. (Garth, 1958). 5-35 fathoms.

**Material Examined.**—Eight specimens from two stations:

**Costa Rica**

Port Parker, January 22, 1938, Station 203, D-2 or D-3, 20 fathoms, 4 males, 2 females; D-7, 9-5 fathoms, 1 male.

Fourteen miles S × E of Judas Point, March 1, 1938, Station 214, D-1, 42 fathoms, 1 male.

**Measurements.**—Males, 6.3 to 10.7 mm., females, 8.2 and 10.9 mm. in length.

**Color in Life.**—Brown or reddish.

**Habitat.**—Shelly sand, algae; or shelly mud.

**Remarks.**—Specimens from among "Velero III" collections from Port Parker were determined by M. J. Rathbun prior to 1937 as *Podochela hemphillii* (Lockington). However, subsequent studies by the writer (Garth, 1948, 1958) have shown *P. angulata* to be the common *Podochela* of the Central American coastline. The length of the dactyl of the fourth walking leg, which almost equals the length of the propodus, is diagnostic.

***Podochela veleronis* Garth**

*Podochela veleronis* (MS name), Garth, 1948, p. 22.

*Podochela veleronis* Garth, 1958, p. 111, pl. G, figs. 1-7; pl. H, fig. 5; pl. 8, fig. 2.

**Range.**—From Los Frailes, Gulf of California, Mexico, to La Plata Island, Ecuador. 1-15 fathoms. (Garth, 1958).

**Material Examined.**—Three specimens from two stations:

**Mexico**

Tangola-Tangola Bay, December 12, 1937, Station 196, D-14, 5 fathoms, 1 ovigerous female.

**Costa Rica**

Piedra Blanca Bay, February 5, 1938, Station 208, D-?, 2-6 fathoms, 2 ovigerous females.

**Measurements.**—Ovigerous females, length 6.1 to 6.4 mm.

**Habitat.**—Crushed shell; rocks, sand, algae.

**Breeding.**—West Mexico in mid-December; Costa Rica in early February.

**Remarks.**—*Podochela veleronis* is a small species more likely to be confused with *Inachoides laevis* Stimpson than with any other *Podochela* species. Although no measurements were given by Garth (1958) to support the statement that specimens of 6 to 7 mm. were adult, the 5.7 mm. female allotype being non-ovigerous, the 6.1 to 6.4 mm. ovigerous females from Mexico and Costa Rica, above, support this contention, as does a 6.0 mm. ovigerous female from among "Velero III" collections.

***Podochela vestita* (Stimpson)**

*Podonema vestita* Stimpson, 1871, p. 97.

*Podochela vestita*, A. Milne Edwards, 1879, p. 195. Rathbun, 1925, p. 42, pl. 14. Crane, 1937, p. 52, pl. 1. Garth, 1948, p. 21; 1958, p. 121, pl. H, fig. 7; pl. 8, fig. 3.

**Range.**—From Hughes Point, Lower California, and Rocky Point, Sonora, Mexico, to Gorgona Island, Colombia. Socorro Island. 2-30 fathoms. (Garth, 1958)

**Material Examined.**—Corinto, Nicaragua, January 7, 1938, Station 200, D-27 to D-30, 3 fathoms, 1 female (soft body).

**Measurements.**—Female specimen, length 12.8 mm.

**Habitat.**—Mangrove leaves.

**Remarks.**—Taken with *Inachoides laevis* Stimpson.

***Podochela ziesenhennei* Garth**

*Podochela ziesenhennei* Garth, 1940, p. 58, pl. 13, figs. 1-6; 1958, p. 127, pl. H, fig. 9; pl. 8, fig. 5.

**Range.**—From Tenacatita Bay, Mexico, to Salango Island, Ecuador. Shore to 10 fathoms. (Garth, 1958).

**Material Examined.**—Port Guatulco, Mexico, December 6, 1937, Station 195, D-14, 4 fathoms, 1 female.

**Measurements.**—Female specimen, length 10.6 mm.

**Habitat.**—Coral bottom.

**Remarks.**—The female from Port Guatulco is post ovigerous and is nearly as large as an 11.0 mm. female from Acapulco recorded by Garth (1958).

***Stenorynchus debilis* (Smith)**

*Leptopodia debilis* Smith, 1871, p. 87.

*Stenorynchus debilis*, Rathbun, 1898, p. 568; 1925, p. 18, pls. 4, 5, text-fig. 4. Finnegan, 1931, p. 617. Crane, 1937, p. 50. Steinbeck & Ricketts, 1941,

p. 465. Garth, 1948, p. 20; 1958, p. 130, pl. B, fig. 7; pl. 9. Buitendijk, 1950, p. 271.

*Range*.—From Magdalena Bay, west coast of Lower California, and Patos Anchorage, Gulf of California, Mexico, to Valparaiso, Chile. Revilla Gigedo, Galapagos and Cocos Islands. Shore to 78 fathoms.

*Material Examined*.—Thirty-six specimens from eleven stations:

#### Mexico

Sulphur Bay, Clarion Island, May 11, 1936, Station 163, D-1, 20 fathoms, 1 young.

Port Guatulco, December 4, 1937, Station 195, D-1, 2.5 fathoms, 2 males, 3 females; D-16, 10 fathoms, 2 males, 2 females.

Tangola-Tangola Bay, December 12, 1937, Station 196, D-15, 5 fathoms, 1 male, 3 females.

#### Nicaragua

Corinto, January 7, 1938, Station 200, D-27 to D-30, 3 fathoms, 1 male.

#### Costa Rica

Port Parker, harbor, January 16, 1938, 6 males, 3 females (1 ovigerous), 2 young.

Port Parker, January 22, 1938, Station 203, D-4, 7 fathoms, 1 male; D-7, 9.5 fathoms, 1 young; D-12, 2 fathoms, 1 male, 1 ovigerous female; D-13, 7-9 fathoms, 1 male.

Port Culebra, January 30, 1938, Station 206, D-1, 14 fathoms, 1 female.

Off Ballenas Bay, Gulf of Nicoya, Station 213, D-17, 35 fathoms, 1 male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4, 6 fathoms, 1 male.

#### Panama

Off Panama, March 13, 1938, Station 221, D-3, 35 fathoms, 1 female, post-ovigerous.

Bahia Honda, March 18, 1938, Station 222, D-4, 11 fathoms, 1 male.

*Measurements*.—Males, 10.3 to 33.1 mm., females 10.1 to 32.8 mm. (ovigerous females 8.5 [without rostrum] and 21.1 mm.), young from 3.9 mm. in length.

*Color in Life*.—Typical coloring, [cf. Crane, 1937] but pale. (Of Port Guatulco specimen).

*Habitat*.—Sand, shell and gravel with algae often present; mud with mangrove leaves frequently present.

*Remarks*.—In measuring the extensive series, specimens under 10.0 mm. were arbitrarily considered as young, although sex could be determined in 9 mm. males. The fact that the rostrum is frequently broken in this species makes it

impossible to give the total length of the smaller of two ovigerous females, or the absolute length of a large male from the Gulf of Nicoya that measured 30 mm. without the terminal portion. Complete measurements of a 38 mm. male and 34 mm. female are given in tabular form by Garth (1958).

#### *Pitho picteti* (Saussure)

*Othonia picteti* Saussure, 1853, p. 357, pl. 13, fig. 2.

*Pitho picteti*, Rathbun, 1923, p. 635; 1925, p. 359, pl. 130, figs. 2, 3; pl. 252, fig. 1. Finnegan, 1931, p. 624. Glassell, 1934, p. 454. Crane, 1937, p. 59. Steinbeck & Ricketts, 1941, p. 466. Garth, 1958, p. 166, pl. J, fig. 1; pl. 17, fig. 1.

*Pitho quinquedentata*, Boone, 1929, p. 563, figs. 1a-b. (Not *P. quinquedentata* Bell.)

*Range*.—From Scammon Lagoon, west coast of Lower California, and off Cape Tepoca, Gulf of California, Mexico, to Saboga Island, Perlas Islands, Panama. Shore to 45 fathoms.

*Material Examined*.—Eighteen specimens from four stations:

#### Mexico

Port Guatulco, December 4, 1937, Station 195, D-1, 2.5 fathoms, 1 ovigerous female; D-3, 3.5 fathoms, 1 young; D-4, 4.5 fathoms, 1 ovigerous female; D-10, 4 fathoms, 1 male, 3 young.

#### Nicaragua

Corinto, December 29, 1937, Station 200, D-5, 2 fathoms, 1 ovigerous female.

#### Costa Rica

Port Parker, January 22, 1938, Station 203, D-6, 1 fathom, 1 ovigerous female; D-11, 2-4 fathoms, 1 ovigerous female, 4 young.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 2 males, 1 female, 1 young.

*Measurements*.—Males, 8.6 to 10.8 mm., females, 8.3 to 12.1 mm. (ovigerous females 10.0 to 12.1 mm.), young from 4.7 mm. in length.

*Breeding*.—Mexico and Nicaragua in December, Costa Rica in January.

*Color in Life*.—Gray with pink longitudinal median stripe, dark gray below. Eggs brick red. (Port Guatulco specimen.)

*Habitat*.—Sand, algae, crushed shell, dead coral; mangrove leaves; rock, gravel, dead coral; mud, sand, crushed shell.

#### *Pitho quinquedentata* Bell

*Pitho quinquedentata* Bell, 1835b, p. 172. Rathbun, 1925, p. 361, pl. 250, figs. 1-4, text-fig. 117a. Garth, 1958, p. 170, pl. J, fig. 2; pl. 18, fig. 1.



*Range*.—Bay of Panama; Galapagos Islands; ?Peru. (Rathbun, 1925). Shore to 20 fathoms. (Garth, 1958).

*Material Examined*.—Three specimens from three stations:

Costa Rica

Port Parker, January 22, 1938, Station 203, D-10, 6-2.5 fathoms, 1 young female.

Piedra Blanca, February 5, 1938, Station 208, D-?, depth?, 1 female.

Panama

Bahia Honda, March 18, 1938, Station 222, D-1, 3 fathoms, 1 female.

*Measurements*.—Female specimens, length 7.3 to 8.2 mm.

*Habitat*.—Rocks; rocks, sand and algae; rock, dead coral.

*Remarks*.—With specimens from Bahia Honda collected by the "Velero III" constituting the only record for the species north of Cape Mala, it is gratifying to have this record confirmed and the range of the species extended to northern Costa Rica by the "Zaca."

*Sphenocarcinus agassizi* Rathbun

*Sphenocarcinus agassizi* Rathbun, 1893, p. 231; 1925, p. 188, pl. 63; pl. 223, figs. 1, 2. Faxon, 1895, p. 7, pl. 1, figs. 3, 3a. Crane, 1937, p. 58. Garth, 1946, p. 379, pl. 63, fig. 2; 1958, p. 217, pl. O, fig. 1; pl. 25, fig. 1.

*Range*.—From off Cape Tepoca, Gulf of California, Mexico, to Bahia Honda, Panama. Galapagos Islands. 14-90 fathoms.

*Material Examined*.—Two specimens from two stations:

Mexico

Gorda Banks, November 13, 1937, Station 150, D-27, 60 fathoms, 1 female.

Panama

Hannibal Bank, March 20, 1938, Station 224, D-2, D-3, 35 fathoms, 2 males, 3 females.

*Measurements*.—Males, 14.3 to 29.6 mm., females, 11.8 to 21.2 mm. in length.

*Color in Life*.—Pale tan with a dark brown stripe on each side of median line of carapace. (Of Gorda Banks specimen.)

*Habitat*.—Sand at Gorda Banks; rocks, mud and dead coral at Hannibal Bank.

*Supplementary Descriptive Note*.—A feature not mentioned by Rathbun is the dorsal flattening of the lateral teeth. This is most apparent on the first, or hepatic tooth, each succeeding lateral tooth showing it to a lesser degree.

*Remarks*.—It is of interest to note the close

correspondence in size of the largest male and female collected by the "Zaca" with the 30.0 mm. male and 23.1 mm. female collected by the "Velero III." Neither male is as large as the 39 mm. male collected by the "Albatross" (Faxon, 1895).

Although the species was early reported from "Bay of Panama" by Faxon (1895, p. 7), the actual locality was Cocos Island, Costa Rica. It remained for the "Velero III" to record the species from the Panamanian mainland at Bahia Honda, a record confirmed by the "Zaca" collection at Hannibal Bank.

*Pelia tumida* (Lockington)

*Pisoides? tumidus* Lockington, 1877a, p. 30.

*Pelia tumida*, Holmes, 1900, p. 35. Rathbun, 1925, p. 281, pl. 99, figs. 2, 3. Garth, 1958, p. 271, pl. Q, fig. 1; pl. 31, fig. 2, text-fig. 6a.

*Range*.—From Santa Cruz Island, California, and Rocky Point, Gulf of California, to Petatlan Bay, Guerrero, Mexico. Shore to 55 (possibly 70) fathoms.

*Material Examined*.—SE of Cedros Island, Lower California, Mexico, November 10, 1937, Station 126, D-19, 25 fathoms, 1 female.

*Measurements*.—Female specimen, length 7.3 mm.

*Habitat*.—Rocks and algae.

*Remarks*.—In this species, which has for its provenance southern California, Lower California, the Gulf of California and the northwest Mexican coast, the rostral horns have their outer margins parallel or divergent, while of the basal antennal article only the anteroexternal angle bearing the spine is visible in dorsal view.

*Pelia pacifica* A. Milne Edwards

*Pelia pacifica* A. Milne Edwards, 1875, p. 73, pl. 16, figs. 3-3c. Rathbun, 1925, p. 283, pl. 98, fig. 1; pl. 99, fig. 1. Crane, 1947, p. 71. Garth, 1958, p. 274, pl. Q, figs. 2-4; pl. 31, fig. 3, text-figs. 6b, 6c.

*Range*.—From Manzanillo, Mexico, to Zorritos Light, Peru. Intertidal, occasionally to 2 fathoms.

*Material Examined*.—Three specimens from two stations:

Nicaragua

Corinto, January 5, 1938, Station 200, D-14, D-15, 1-3 fathoms, 2 females (one ovigerous).

Costa Rica

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 8 fathoms, 1 male.

*Measurements*.—Male specimen 5.25 mm.,

females 4.9 and 6.5 mm. (ovigerous female 4.9 mm.) in length.

*Habitat*.—Mangrove leaves and mud.

*Breeding*.—Nicaragua in early January.

*Remarks*.—Since *Pelia pacifica* was reported by Crane (1947) from the intertidal zone of Corinto, Nicaragua, and at Jasper Island and Uvita, Costa Rica, it was thought that dredged specimens from these two countries might prove to be the foregoing *P. tumida*, which occurs in more northerly waters in depths to 55 fathoms. Comparison with the Cedros Island, Mexico, specimen, and with typical *P. tumida* from southern California, however, revealed these constant differences: the rostral horns of the Central American specimens invariably have their outer margins converging, while of the basal antennal article fully half, rather than just the anteroexternal angle, is visible in dorsal view.

#### *Notolopas lamellatus* Stimpson

*Notolopas lamellatus* Stimpson, 1871, p. 97. Rathbun, 1925, p. 287, pl. 81; pl. 238, fig. 1, text-fig. 95. Garth, 1948, p. 26; 1958, p. 295, pl. Q, fig. 8; pl. 33, fig. 1.

*Pelia orbiculata* Finnegan, 1931, p. 621, text-fig. 4.

*Range*.—From Rocky Point, Sonora, Mexico, to La Libertad, Ecuador. Shore to 20 (exceptionally 55) fathoms. (Garth, 1958).

*Material Examined*.—Twenty-five specimens from four stations:

#### El Salvador

La Libertad, December 16, 1937, Station 198, D-1, 13 fathoms, 1 male, 1 ovigerous female; D-2, 14 fathoms, 1 ovigerous female.

La Union, Gulf of Fonseca, December 27, 1937, Station 199, D-8, 6 fathoms, 1 ovigerous female; D-21, 3 fathoms, 1 ovigerous female.

#### Nicaragua

Corinto, December 29, 1937, Station 200, D-5, 2 fathoms, 2 males, 2 females (1 ovigerous), 1 young; D-5, 2 fathoms, 1 young; D-27, D-30, 3 fathoms, 6 males, 5 females (1 ovigerous).

#### Costa Rica

Piedra Blanca Bay, February 5, 1938, Station 208, D-?, depth?, 2 males, 1 young.

*Measurements*.—Males 5.6 to 13.6 mm., females 6.0 to 19.3 mm. (ovigerous females 8.3 to 19.3 mm.), young from 4.2 mm. in length.

*Habitat*.—Mud; mangrove leaves; rocks, algae.

*Breeding*.—El Salvador in mid- to late December; Nicaragua in late December and early January.

*Remarks*.—Specimens from El Salvador lack the interorbital spine and have a broad exorbital lobe. Two ovigerous females are exceptionally large and show divergence of rostral horns and a cardiac tubercle. Specimens from Corinto, Nicaragua, have the interorbital spine, and one female carries a rhizocephalan parasite. Specimens are variously decorated with algae, hydroids and bryozoans.

The 19.3 mm. ovigerous female above is larger than the 15.5 mm. ovigerous female reported by Garth (1958).

#### *Herbstia camptacantha* (Stimpson)

*Herbstiella camptacantha* Stimpson, 1871, p. 94.

*Herbstia camptacantha*, A. Milne Edwards, 1875, p. 78, pl. 18, figs. 3-3e. Rathbun, 1925, p. 294, pl. 105, figs. 1, 2; pl. 240, figs. 9-13. Garth, 1958, p. 301, pl. S, fig. 1; pl. 34, fig. 1.

*Range*.—From San Pedro Bay, Sonora, to Tangola-Tangola Bay, Guerrero, Mexico. Shore to 4.5 fathoms.

*Material Examined*.—Sixteen specimens from three stations:

#### Mexico

Sihuatanejo, November 24, 1937, 3 males, 5 ovigerous females.

Acapulco Beach, November 26-28, 1937, 1 ovigerous female.

Port Guatulco, December 6, 1937, Station 195, D-14, 4 fathoms, 1 male; D-15, 1.5 fathoms, 4 males, 2 ovigerous females.

*Measurements*.—Males 7.0 to 14.0 mm., ovigerous females 11.0 to 18.2 mm. in length.

*Breeding*.—Mexico in late November and early December.

*Habitat*.—Coral.

*Remarks*.—Although *Pocillopora* coral was included by Crane (1937, p. 88) as an intertidal habitat because of its partial exposure during spring tides, its normal depth range is adtidal, or from one to four fathoms. Included among the dredgings from Port Guatulco were coral heads that yielded a species of *Herbstia*, *H. camptacantha*, not encountered in coral obtained by other methods and from shallower depths, where the common *Herbstia* was *H. tumida* (Stimpson).

The 18.2 mm. ovigerous female above is larger than the 14.3 mm. ovigerous female reported by Garth (1958), and would be even longer were it not for the fact that the rostrum is broken off near the base. For this reason complete measurements are not given.



***Herbstia pubescens* Stimpson**

*Herbstia pubescens* Stimpson, 1871, p. 92. Rathbun, 1925, p. 302. Garth, 1948, p. 27; 1958, p. 308, pl. S, fig. 7; pl. 34, fig. 3.

**Range.**—From Manzanillo, Mexico, to La Plata Island, Ecuador. (Garth, 1948). Shallow water to 3.5 fathoms. (Garth, 1958).

**Material Examined.**—Four specimens from two stations:

**Costa Rica**

Port Parker, January 19, 1938, abajo coral, 1 male, 1 ovigerous female.

Port Culebra, January 31, 1938, *Pocillopora*, 1 male, 1 female.

**Measurements.**—Males 9.1 and 15.5 mm., females 8.0 and 16.8 mm., the latter ovigerous. The larger male exceeds the 14.0 mm. male reported by Garth (1958), and measures as follows: length 15.5 mm., width 11.8 mm., rostrum 1.7 mm., width 2.3 mm., cheliped 18.5 mm., chela 11.9 mm., dactyl 5.3 mm., height of palm 4.4 mm. The 16.8 mm. ovigerous female also exceeds the 14.6 mm. ovigerous female reported by Garth (1948) but is so overgrown with barnacles that complete measurements cannot be given.

**Habitat.**—*Pocillopora* coral.

**Breeding.**—Costa Rica in January.

**Remarks.**—That *Herbstia pubescens* is a constant concomitant of the coral colony throughout at least the southern portion of its range, from Puerto Culebra, Costa Rica, southward, is apparent from the collections of the "Askoy," the "Zaca" and the "Veleró III." Previous to their advent, it had been unknown in these waters, Stimpson's type locality having been Manzanillo, to the north. The female specimen from Port Parker carries a tremendous weight of *Balanus* for its size.

***Herbstia tumida* (Stimpson)**

*Herbstiella tumida* Stimpson, 1871, p. 95.

*Herbstia tumida*, A. Milne Edwards, 1875, p. 79. Rathbun, 1925, p. 229, pl. 105, figs. 5, 6. Finnegan, 1931, p. 623. Crane, 1937, p. 59; 1947, p. 72. Garth, 1948, p. 27; 1958, p. 313, pl. R, figs. 1-5; pl. S, figs. 3, 4, 6; pl. 34, fig. 4.

**Range.**—From Arena Bank, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Clarion and Cocos Islands. Shore to 15 (exceptionally to 50) fathoms. (Garth, 1958).

**Material Examined.**—From Jasper Island, Gulf of Nicoya, Costa Rica, February 23, 1938, 2 males, 1 ovigerous female.

**Measurements.**—Males 7.1 and 9.0 mm., female 9.8 mm. in length.

**Breeding.**—Costa Rica in late February.

**Habitat.**—[*Pocillopora*] coral.

**Remarks.**—Since no depth is given with the specimens above, their separation for purposes of report from the immature female from Bahia Honda, Panama (Crane, 1947, p. 72) would appear to serve no useful purpose, particularly in view of the fact that the species has been reported by Crane (1937, p. 59) from *Pocillopora ligulata* in 2.5 fathoms in the Gulf of California, albeit with a question mark.

The 9.8 mm. ovigerous female from the Gulf of Nicoya is larger than either the 8.6 mm. non-ovigerous or 8.3 mm. ovigerous females reported from the mainland, but not as large as the 10.8 mm. ovigerous female reported from Clarion Island by Garth (1958).

***Lissa aurivilliusi* Rathbun**

*Lissa aurivilliusi* Rathbun, 1898, p. 575, pl. 41, fig. 4; 1925, p. 333, pl. 246, fig. 2. Crane, 1937, p. 59. Garth, 1946, p. 384, pl. 65, figs. 3, 4; 1958, p. 335, pl. T, fig. 8; pl. 33, fig. 4.

**Range.**—From Santa Maria Bay, Lower California, and Puerto Refugio, Angel de la Guarda Island, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Galapagos Islands. 2 to 35 (exceptionally 70) fathoms. (Garth, 1958).

**Material Examined.**—Port Parker, Costa Rica, January 20, 1938, Station 203, D-2, 10 fathoms, 1 male.

**Measurements.**—Male specimen, length 9.0 mm.

**Habitat.**—Shelly sand, algae.

**Remarks.**—The species varies greatly in the degree of development of the rostral horns and the lateral extent of the branchial regions.

***Maiopsis panamensis* Faxon**

*Maiopsis panamensis* Faxon, 1893, p. 151; 1895, p. 13, pl. 2. Rathbun, 1925, p. 338, pl. 247. Garth, 1958, p. 342, pl. U, figs. 3, 3a; pl. 38, figs. 1, 2; pl. 39, fig. 1.

**Range.**—Clarion Island; Bay of Panama to Ecuador. 48-182 fathoms.

**Material Examined.**—Hannibal Bank, Panama, March 20, 1938, Station 224, D-1, 40 fathoms, 1 female.

**Measurements.**—Female specimen, length 62.2 mm., width including lateral spines 62.7 mm., without spines 52.2 mm. Complete measurements of a larger female from Clarion Island and of a large male from Ecuador are given by Garth (1958).

**Habitat.**—Rocks, dead coral.

**Remarks.**—The "Zaca" record above is the



first from Panama since the type specimen, a male, was collected by the "Albatross" in 1891. In the interim, a second male was collected at Manta, Ecuador, by Capt. Paessler and a female at Clarion Island, Mexico, by the "Velero III." (Garth, 1958). The Hannibal Bank female is 10 mm. shorter than the Clarion Island specimen.

***Ala cornuta* (Stimpson)**

*Anaptychus cornutus* Stimpson, 1860, p. 184, pl. 2, figs. 1, 1a, 1b. Rathbun, 1925, p. 378, pl. 134, figs. 4, 5; pl. 254, fig. 1; text-fig. 122. Steinbeck & Ricketts, 1941, p. 467. Crane, 1947, p. 72. Garth, 1948, p. 28.

*Ala cornuta*, Garth, 1958, p. 349, pl. V, figs. 1, 2; pl. 39, fig. 2.

**Range.**—From Cholla Bay, Gulf of California, Mexico, to Port Utria, Colombia. Shore to 12 fathoms.

**Material Examined.**—Port Parker, Costa Rica, January 22, 1938, Station 203, D-10, 6-2.5 fathoms, 1 young; D-11, 2-4 fathoms, 1 male.

**Measurements.**—Male specimen, length 12.0 mm., young specimen, length 5.0 mm.

**Habitat.**—Rocks.

**Remarks.**—The species is reported from the intertidal zone by Crane (1947, p. 72) at two Mexican, five Costa Rican and one Panamanian localities, at extreme low-tide level and in *Pocillopora* coral. It is therefore not surprising that it should be taken also in shallow dredging. The 5 mm. young has long rostral spines and might easily be mistaken for another species.

***Mithrax (Mithrax) sinensis clarionensis* Garth**

*Mithrax (Mithrax) clarionensis* Garth, 1940, p. 63, pl. 15, figs. 1-3.

*Mithrax (Mithrax) sinensis clarionensis*, Garth, 1958, p. 363, pl. V, fig. 6; pl. 41, fig. 3.

**Range.**—Restricted to Clarion Island, Mexico. 15-57 fathoms.

**Material Examined.**—Sulphur Bay, Clarion Island, Mexico, May 11, 1936, Station 163, D-1, 20 fathoms, 1 male.

**Measurements.**—Male specimen, length 9.4 mm., width 8.8 mm.

**Habitat.**—Not given.

**Remarks.**—While the isolation of Clarion Island from Gulf of Californian *Mithrax (Mithrax) sinensis* Rathbun is amply evident in the finer tuberculation of the former, their male first pleopods are identical.

***Mithrax (Mithrax) pygmaeus* Bell**

*Mithrax pygmaeus* Bell, 1835b, p. 172; 1836, p. 55, pl. 11, figs. 3, 3f-h. Finnegan, 1931, p. 624. Crane, 1947, p. 73.

*Mithrax (Mithrax) pygmaeus*, Rathbun, 1925, p. 406, pl. 262, figs. 1-4. Garth, 1948, p. 29; 1958, p. 364, pl. V, fig. 7; pl. 41, fig. 4.

**Range.**—From Isabel Island, Mexico, to La Plata Island, Ecuador. Socorro Island; Galapagos Islands. Low-tide level to 25 fathoms.

**Material Examined.**—Five specimens from three stations:

**Mexico**

Port Guatulco, December 5, 1937, Station 195, D-8, 6 fathoms, 1 ovigerous female; D-9, 7 fathoms, 1 male.

Tangola-Tangola Bay, December 12, 1937, Station 196, D-14, D-15, 5 fathoms, 1 female.

**Costa Rica**

Port Parker, January 22, 1938, Station 203, D-5, 3 fathoms, 1 ovigerous female; D-10, 6-2.5 fathoms, 1 female.

**Measurements.**—Male, 7.8 mm., females, 5.2 to 6.3 mm. in length; ovigerous females same. Largest specimen, male, length 7.8 mm., width including spines 8.4 mm., female, length 6.3, width 6.8 mm.

**Habitat.**—Sand, algae, crushed shell; dead coral; rocks.

**Breeding.**—Mexico in early December; Costa Rica in late January.

**Remarks.**—The species was recorded also by Crane (1947) from the intertidal, where it occurs in the *Pocillopora* colony. All females were either with ova or had borne ova previously. The long bare chelipeds of the male are characteristic of the species.

***Mithrax (Mithraculus) denticulatus* Bell**

*Mithrax denticulatus* Bell, 1835b, p. 172; 1836, p. 54, pl. 11, figs. 2, 2c-e. Crane, 1947, p. 73.

*Mithrax areolatus* Lockington, 1877b, p. 71.

*Mithrax (Mithraculus) denticulatus*, Rathbun, 1925, p. 428; pl. 154, figs. 2, 3. Garth, 1958, p. 372, pl. V, fig. 9; pl. 42, fig. 2. Buitendijk, 1950, p. 274.

**Range.**—From San Diego, California (extralimital), and Agua Verde Bay, Gulf of California, Mexico, to Manta Bay, Ecuador. Intertidal, occasionally dredged to 13 fathoms. Absent from the Revilla Gigedo Islands, and from Galapagos Islands, where it is replaced by *Mithrax (Mithraculus) nodosus* Bell.

**Material Examined.**—Port Guatulco, Mexico, December 4, 1937, Station 195, D-4, 4.5 fathoms, 1 young male.

**Measurements.**—Young male, length 5.9 mm.

**Habitat.**—Sand, crushed shell, algae.

**Remarks.**—Eighty-six specimens were recorded by Crane (1947, p. 73) from four Mexican, four Costa Rican and one Panamanian

localities, where they occurred under stones at extreme low tide (zone 3), in tidepools among weed (zone 4), and in *Pocillopora* coral (zone 5). The above specimen, dredged in 4.5 fathoms, merely adds another zone, the subtidal or adtidal, which, except for exposure, cannot differ greatly from zones 3 and 4.

For a discussion of color variability, and for reasons for including *Mithrax areolatus* Lockington (1877) in the synonymy, see Crane (*op. cit.*).

***Microphrys platysoma* (Stimpson)**

*Milnia platysoma* Stimpson, 1860, p. 180.

*Microphrys platysoma*, A. Milne Edwards, 1875, p. 62. Rathbun, 1925, p. 479, pl. 176, figs. 1, 2; text-fig. 140. Crane, 1937, p. 63; 1947, p. 74. Steinbeck & Ricketts, 1941, p. 467, pl. 32, fig. 6. Garth, 1946, p. 405, pl. 68, figs. 3, 4; 1948, p. 30; 1958, p. 392, pl. W, fig. 5; pl. 43, fig. 3.

**Range.**—From 10 miles west of Punta Malarrimo, Lower California, and Puerto Refugio, Angel de la Guarda Island, Gulf of California, Mexico, to Punta Santa Elena, Ecuador. Clarion and Socorro Islands; Galapagos Islands. Intertidal to 40 (not 70) fathoms. (Garth, 1958).

**Material Examined.**—Jasper Island, Gulf of Nicoya, Costa Rica, February 23, 1938, 1 male.

**Measurements.**—Male specimen, length 13.1 mm., width 10.6 mm.

**Habitat.**—Not given.

**Remarks.**—Previously reported from the intertidal of Clarion Island, Costa Rica and Panama, where it occurs under stones at low-tide level, in tidepools and in *Pocillopora* coral, zones 3, 4, and 5. (Crane, 1947).

***Microphrys triangulatus* (Lockington)**

*Mithraculus triangulatus* Lockington, 1877b, p. 73.

*Microphrys triangulatus*, Rathbun, 1898, p. 578; 1925, p. 505, pl. 177, text-fig. 147. Garth, 1946, p. 403, pl. 63, fig. 6; 1958, p. 395, pl. W, figs. 6, 9; pl. 43, fig. 4.

**Range.**—From off Concepción Bay, Gulf of California, Mexico, to Bahia Honda, Panama. Galapagos Islands. Intertidal to 44 fathoms. (Garth, 1958).

**Material Examined.**—Fifty-three specimens from a single station:

**Mexico**

Port Guatulco, Station 195, December 4, 1937, D-3, 3.5 fathoms, 1 male, 1 female; D-4, 4.5 fathoms, 14 males, 7 females (4 ovigerous); D-5 to D-8, 5 fathoms, 14 males, 12 females (8 ovigerous); December 6, 1937, D-10, 4 fathoms, 2 females; D-14, 4 fathoms, 2 males.

**Measurements.**—Males, 5.3 to 12.1 mm., fe-

males, 6.2 to 10.0 mm. (ovigerous females 7.1 to 10.0 mm.) in length.

**Color in Life.**—Purple with olive buff pile. Eggs raspberry.

**Habitat.**—Sand, crushed shell, algae, dead coral.

**Breeding.**—Mexico in early December.

**Remarks.**—The Port Guatulco specimens are important from the standpoint of distribution, the species having been recorded outside the Gulf of California and on the mainland only at Acaapulco, Mexico, and Bahia Honda, Panama.

***Microphrys branchialis* Rathbun**

*Microphrys branchialis* Rathbun, 1898, p. 577, pl. 41, fig. 5; 1925, p. 502, pl. 176, figs. 5, 6; pl. 270, fig. 1; text-fig. 143. Crane, 1937, p. 63. Schmitt, 1939, p. 9. Garth, 1958, p. 398, pl. W, figs. 7, 8; pl. 44, fig. 1.

**Range.**—From Dewey Channel, west coast of Lower California, and from Angeles Bay, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. 5-50 fathoms.

**Material Examined.**—Six specimens from two stations:

**Mexico**

SE of Cedros Island, November 10, 1937, Station 126, D-19, 25 fathoms, 1 ovigerous female.

**Costa Rica**

Port Parker, January 20, 1938, Station 203, D-2, D-3, 10-12 fathoms, 2 males; D-7, 9-5 fathoms, 2 males, 1 ovigerous female.

**Measurements.**—Males, 5.6 to 10.5 mm., females, 8.6 and 9.1 mm. (ovigerous females same) in length.

**Color in Life.**—Carapace deep purple; legs and under parts brown; eggs dark purple. (Of Cedros Island specimen.)

**Habitat.**—Rocks, algae; shelly sand, algae, shelly mud.

**Breeding.**—Lower California in early November; Costa Rica in late January.

**Remarks.**—The intermittent and sometimes overlapping ranges of this species and the related *Microphrys triangulatus* are discussed by Garth (1958, p. 400). Unlike the companion species, *M. branchialis* is never collected intertidally.

***Stenocionops ovata* (Bell)**

*Pericera ovata* Bell, 1835b, p. 173; 1836, p. 60, pl. 12, figs. 5, 50-q.

*Stenocionops triangulata*, Rathbun, 1925, p. 461, pl. 165, fig. 1; pl. 266, fig. 1. Garth, 1946, p. 401, pl. 67, figs. 1, 2; pl. 68, fig. 2.

TABLE I. *Stenocionops ovata* (BELL)

Sex	Length	Number of median carapace spines*				
		gastric	genital	cardiac	intestinal	total
♂	51.0 mm	4	1	3	1	9
♂	42.9 mm	2(1)2	1	3	1	9(1)
♀	42.6 mm	4	0	3	1	8
♀	41.4 mm	4	1	3	1	9
♂	41.2 mm	4	1	3	1	9
♀	39.0 mm	4	1	3	1	9
♂	37.2 mm	4	1	1(2)	1	7(2)
♀	36.1 mm	4	0	3	1	8
♀	34.4 mm	4	(1)	1(2)	1	6(3)
♂	34.0 mm	4	0	1	1	6
♀	33.1 mm	4	0	3	1	8
♂	32.0 mm†	4	0	2	1	7
♀	31.8 mm	4	1	3	1	9
♂	29.8 mm	4	0	1(2)	1	6(2)
♂	28.5 mm	4	1	2	1	8
♂	26.2 mm	4	0	1(1)	1	6(1)

\* Incipient or reduced spines in parentheses

† Broken rostrum

*Stenocionops ovata*, Rathbun, 1910, p. 574. Boone, 1938, pp. 201, 220, pls. 79, 80. Garth, 1958, p. 405, pl. Y, fig. 2; pl. 44, fig. 2.

*Stenocionops macdonaldi*, Rathbun, 1925, p. 460, pl. 268. Crane, 1937, p. 62.

**Range.**—From off Abreojos Point, west coast of Lower California, and Tiburon Island, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Galapagos Islands. 8-150 fathoms. (Garth, 1958).

**Material Examined.**—Manzanillo, Mexico, November 22, 1937, Station 184, D-2, 30 fathoms, 9 males, 7 females, all adolescent.

**Measurements.**—See Table I.

**Color in Life.**—Dusty pink.

**Habitat.**—Gravelly sand.

**Remarks.**—The above series of 16 specimens of 26 to 51 mm. length is the one that should have been used in synonymizing *Stenocionops triangulata* (Rathbun, 1892) with *S. macdonaldi* (Rathbun, 1892), as suggested by Crane (1937). Fortunately, the action taken by Boone (1938, p. 220) on the strength of one large male dredged at Hannibal Bank, Panama, by the "Alva" is supported by this supplementary material. Needed now is a similar series from the Galapagos Islands to demonstrate conclusively Boone's correctness in synonymizing both to *Stenocionops ovata* (Bell), which has a Galapagan type locality.

From the above table it will be seen that, with the exception of the 42.9 mm. male with an incipient fifth spine, the number of gastric spines remains constant at four, as does the intestinal spine at one. The genital spine is pres-

ent with but one exception in specimens over 37 mm. The greatest irregularity occurs with the cardiac spines, the posterior two of which are often poorly developed or even wanting in specimens under 39 mm.

#### *Macrocoeloma maccullochae* Garth

*Macrocoeloma maccullochae* Garth, 1940, p. 65, pl. 16, figs. 1-4; 1958, p. 413, pl. Y, fig. 4; pl. 46, fig. 1.

**Range.**—From Isabel Island, Mexico, to Santa Elena Bay, Ecuador. 10 to 30 fathoms. (Garth, 1958).

**Material Examined.**—Four specimens from two stations:

#### Mexico

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 1 male.

#### Costa Rica

Port Parker, Station 203, January 20, 1938, D-2, 10 fathoms, 1 male; January 22, 1938, D-4, 7 fathoms, 1 young; D-5, 3 fathoms, 1 young male.

**Measurements.**—Largest specimen, male: length 41.3 mm., width including lateral spines 28.1 mm., without spines 24.8 mm., rostrum 10.2 mm., width 3.7 mm., cheliped 48.6 mm., chela 22.0 mm., dactyl 7.3 mm., height of palm 3.3 mm., walking legs 42.0, 33.5, 28.5, and 25.5 mm., respectively.

**Habitat.**—Gravelly sand; shelly sand, with algae; shells, dead coral.

**Remarks.**—The Manzanillo male is the largest specimen on record, measuring a full 10 mm.



longer than the male holotype. Its rostrum is perfect, whereas the tip of the rostrum of the holotype is broken. The narrowness of the young, mentioned by Garth (1958) as characteristic of the species, is noticeable in males of 7.6 and 10.5 mm. in the present series. While the species was earlier reported from Port Parker (Garth, 1940), this proved to be an error for Playa Blanca, Costa Rica (Garth, 1958). The Manzanillo record is new and bridges the gap between Costa Rica and Isabel Island, Mexico.

***Hemus finneganae* Garth**

*Hemus finneganae* Garth, 1958, p. 422, pl. X, figs. 1-6; pl. Y, fig. 7; pl. 47, fig. 2.

**Range.**—From Angel de la Guarda Island, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Revilla Gigedo Islands. Shore to 32 fathoms. (Garth, 1958).

**Material Examined.**—Eighteen specimens from three stations:

**Mexico**

Port Guatulco, December 4, 1937, Station 195, D-4, 4.5 fathoms, 1 female.

**Costa Rica**

Port Parker, January 22, 1938, Station 203, D-5, 3 fathoms, 2 males, 3 ovigerous females; D-6, 1 fathom, 3 specimens; D-10, 6-2.5 fathoms, 1 male, 1 ovigerous female; D-11, 2-4 fathoms, 2 ovigerous females.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 1 male, 4 females (2 ovigerous).

**Measurements.**—Males, 6.6 to 8.0 mm., females, 5.5 to 7.8 mm. (ovigerous females, 5.5 to 7.8 mm.) in length. Complete measurements of the largest male, which exceeds by 1.3 mm. the 6.7 mm. holotype (Garth, 1958), are as follows: length 8.0 mm., width 6.9 mm., rostrum 0.9 mm., width 1.35 mm., cheliped 5.3 mm., chela 2.0 mm., dactyl 0.9 mm., ambulatory legs 6.9, 6.8, 6.2, and 4.2 mm., respectively. The feeble cheliped should be noted.

**Habitat.**—Sand, algae and crushed shell; rocks and gravel; mud; dead coral.

**Breeding.**—Costa Rica in late January and early February.

**Remarks.**—It is unusual to find a new species the exclusive occupant of so large a territory as is *Hemus finneganae*. The reason is that the companion species, *H. analogus* Rathbun, is not the Pacific analogue of the Atlantic *H. cristulipes*, as Rathbun supposed, but a Gulf of California endemic species that apparently comes no fur-

ther south than Tenacatita Bay, Mexico. *H. finneganae* ranges both north and south of the more strictly limited *H. analogus*, and represents *H. cristulipes* in the Bay of Panama.

**Family PARTHENOPIDAE**

***Parthenope (Parthenope) hyponca* (Stimpson)**

*Lambrus hyponcus* Stimpson, 1871, p. 100.

*Parthenope (Parthenope) hyponca*, Rathbun, 1925, p. 514, pl. 275, figs. 4-6. Garth, 1948, p. 30; 1958, p. 436, pl. Z<sub>1</sub>, figs. 1, 1a; pl. 48, fig. 1.

**Range.**—From Mazatlan, Mexico, to Punta Santa Elena, Ecuador. 3-25 fathoms. (Garth, 1958).

**Material Examined.**—Corinto, Nicaragua, Station 200, December 29, 1937, D-7, 2 fathoms, 1 young male; January 5, 1938, D-14, D-15, 1-3 fathoms, 1 young male.

**Measurements.**—Young males, 4.7 × 4.8 mm. and 5.0 × 4.9 mm., respectively.

**Habitat.**—Mangrove leaves. One specimen had coarse, dark sand grains adhering.

**Remarks.**—The above record is the first from Nicaragua.

***Parthenope (Platylambrus) exilipes* (Rathbun)**

*Lambrus (Parthenolambrus) exilipes* Rathbun, 1893, p. 234.

*Parthenope (Platylambrus) exilipes*, Rathbun, 1925, p. 523, pls. 184, 185; pl. 277, figs. 1, 2. Crane, 1937, p. 64. Garth, 1946, p. 409, pl. 69, fig. 2; 1958, p. 439, pl. Z<sub>1</sub>, figs. 3, 3a; pl. 48, fig. 2.

**Range.**—From San Domingo Point, Lower California, and Boca de la Trinidad, Gulf of California, Mexico, to Lobos de Afuera Island, Peru. Socorro Island; Galapagos Islands. 12-95 fathoms; occasionally taken intertidally. (Garth, 1958).

**Material Examined.**—Twenty-six specimens from four stations:

**Mexico**

Gorda Banks, November 13, 1937, Station 150, D-27, 60 fathoms, 1 female.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 2 males, 6 females (3 ovigerous).

**Costa Rica**

Fourteen miles S × E of Judas Point, March 1, 1938, Station 214, D-1, 42 fathoms, 1 male; D-3, D-4, 50-61 fathoms, 3 males, 10 females (1 ovigerous).

**Panama**

Hannibal Bank, March 20, 1938, Station 224, D-1, D-2, 35-40 fathoms, 1 male, 1 female, 1 young.

**Measurements.**—Males, 11.1 mm. to 33.1 mm., females, 13.8 to 24.5 mm., ovigerous females, 18.8 to 23.5 mm., young from 8.3 mm. in length. The largest male exceeds the 15.6 mm. male reported by Garth (1958) and measures as follows: length 33.1 mm., width including spines 49.5 mm., rostrum 2.5 mm., width 1.7 mm., cheliped 112 mm., chela 55.5 mm., dactyl 18.5 mm., height of palm 8.3 mm.

**Color in Life.**—Pale tan, except inside of chelipeds, which are salmon pink. A band of deep purple across inside of base of chelae. Posterior anterolateral line pale pink. (Of Gorda Banks female.) Carapace dark brown except white cardiac and intestinal regions. Inner margins of chelipeds salmon orange. (Of Manzanillo specimen.)

**Habitat.**—Sand, gravelly sand; mud, with shell or rocks; rocks, mud and dead coral.

**Breeding.**—Mexico in late November; Costa Rica in early March.

**Remarks.**—The size of the specimens is remarkable. The measured male above had a span of 230 mm., or 9 inches, with chelipeds fully extended.

#### *Daldorfia garthi* Glassell

*Daldorfia garthi* Glassell, 1940, p. 67, pl. 17, figs. 1-11. Garth, 1946, p. 412, pl. 55, figs. 1-11; 1958, p. 455, pl. Z<sub>2</sub>, figs. 7, 7a; pl. 51, fig. 2. Crane, 1947, p. 74.

**Range.**—From Cape San Lucas, Lower California, Mexico, to Octavia Bay, Colombia. Galapagos Islands. Shore to 12 fathoms. (Garth, 1958).

**Material Examined.**—Two specimens from as many stations:

#### Mexico

Port Guatulco, December 4, 1937, Station 195, D-4, 4.5 fathoms, 1 male.

#### Costa Rica

Port Culebra, January 29, 1938, coral, 1 female.

**Measurements.**—Male, length 10.7 mm., width 15.5 mm. Female, length 13.1 mm., width 20.0 mm.

**Color in Life.**—Apparently purple underneath growth of white bryozoans. (Of Port Guatulco male).

**Habitat.**—Sand, algae, crushed shell; coral.

**Remarks.**—This species was the only parthenopid taken intertidally by the "Zaca," a large, worn male having been reported by Crane (1947, p. 74) from under a rock at extreme low-tide level (zone 3) at Port Parker, Costa Rica.

#### *Solenolambrus arcuatus* Stimpson

*Solenolambrus arcuatus* Stimpson, 1871, p. 101. Rathbun, 1925, p. 538. Finnegan, 1931, p. 625. Garth, 1946, p. 413, pl. 69, figs. 3, 4; 1948, p. 31; 1958, p. 459, pl. Z<sub>3</sub>, figs. 9, 9a; pl. 52, fig. 1.

**Range.**—From Tepoca Bay, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Socorro Island; Galapagos Islands. 1.5 to 60 fathoms. (Garth, 1958).

**Material Examined.**—Twenty-one specimens from two stations:

#### Costa Rica

Port Parker, January 22, 1938, Station 203, D-4, 7 fathoms, 1 male.

#### Colombia

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 10 males, 4 females, 6 young.

**Measurements.**—Largest specimen, male, length 10.8 mm., width 13.9 mm. Largest female, length 8.5 mm., width 10.7 mm. Males, 6.8 to 10.8 mm., females, 7.3 to 8.5 mm. Young from 5.0 mm.

**Habitat.**—Gravel, algae; sand.

**Remarks.**—The 10.8 mm. male above is larger than the 10.7 mm. male reported by Garth (1958), although not so large as an 11.2 mm. female.

#### *Leiolumbrus punctatissimus* (Owen)

*Parthenope punctatissima* Owen, 1839, p. 81, pl. 24, fig. 4.

*Leiolumbrus punctatissimus*, Holmes, 1900, p. 46. Rathbun, 1925, p. 543, pl. 198, text-fig. 149. Finnegan, 1931, p. 626. Garth, 1948, p. 32; 1958, p. 462, pl. Z<sub>3</sub>, figs. 10, 10a; pl. 52, fig. 2.

**Range.**—From off Point Tosco, Lower California, and off Guaymas, Gulf of California, Mexico, to Salango Island, Ecuador. (Garth, 1958). Not California (Owen). 12-45 fathoms.

**Material Examined.**—Four specimens from two stations:

#### Costa Rica

Off Ballenas Bay, Gulf of Nicoya, February 25, 1938, Station 213, D-11, D-12, D-13, 35 fathoms, 1 male, 2 females.

#### Panama

Gulf of Chiriqui, March 13, 1938, Station 221, D-4, 38 fathoms, 1 young female.

**Measurements.**—Largest specimen, female, length 18.1 mm., width 24.2 mm. Largest male, length 14.5 mm., width 20.1 mm. Females, 9.0 to 18.1 mm. in length.

**Habitat.**—Mud; sandy mud.



**Remarks.**—The 18.1 mm. female is larger than the 11.3 mm. female, but not as large as the 19.6 mm. male reported by Garth (1958).

***Mesorhoea belli* (A. Milne Edwards)**

*Solenolambrus belli* A. Milne Edwards, 1878, p. 163, pl. 29, figs. 6-6d.

*Mesorhoea belli*, Rathbun, 1925, p. 548, pl. 201; pl. 280, figs. 1-4. Crane, 1937, p. 65. Garth, 1946, p. 414, pl. 69, figs. 5, 6; 1948, p. 32.

*Mesorhoea belli*, Garth, 1958, p. 465, pl. Z<sub>3</sub>, figs. 11, 11a; pl. 54, fig. 1.

**Range.**—From San Juanico Bay, Lower California, and Georges Island, Gulf of California, Mexico, to off Esmeraldas, Ecuador. Galapagos Islands. 10-40 (exceptionally to 90) fathoms. (Garth, 1958).

**Material Examined.**—14 miles S × E of Judas Point, Costa Rica, March 1, 1938, Station 214, D-3, 50 fathoms, 1 female.

**Measurements.**—Female specimen, length 14.8 mm., width 19.5 mm.

**Habitat.**—Mud.

**Remarks.**—The 14.8 mm. female above corresponds to the largest (14.9 mm.) specimen reported by Garth (1958), also a female.

***Cryptopodia hassleri* Rathbun**

*Cryptopodia hassleri* Rathbun, 1925, p. 554, pl. 202, figs. 1, 2. Garth, 1948, p. 32; 1958, p. 471, pl. Z<sub>4</sub>, figs. 15, 15a; pl. 54, fig. 2.

**Range.**—From Santa Maria Bay, west coast of Lower California, and Puerto Refugio, Angel de la Guarda Island, Gulf of California, Mexico, to Santa Elena Bay, Ecuador.

**Material Examined.**—Three specimens from two stations:

**Costa Rica**

Port Parker, January 20, 1938, Station 203, D-2, D-3, 12 fathoms, 1 male, 1 female.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 1 male.

**Measurements.**—Largest specimen, male, length 6.25 mm., width 9.75 mm. Female specimen, length 4.1 mm., width 5.7 mm. Smaller male, length 4.3 mm., width 6.4 mm.

**Habitat.**—Mud; shelly mud.

**Remarks.**—The Gulf of Nicoya male is perfect in every detail and would have provided a better photographic illustration than that in Garth (1958, pl. 54, fig. 2), which is of an imperfect specimen.

***Heterocrypta macrobrachia* Stimpson**

*Heterocrypta macrobrachia* Stimpson, 1871, p. 103.

Rathbun, 1925, p. 558, pl. 203, figs. 3, 4; pl. 282, figs. 4, 5. Garth, 1948, p. 33; 1958, p. 474, pl. Z<sub>4</sub>, figs. 16, 16a; pl. 55, fig. 1.

**Range.**—From Santa Maria Bay, west coast of Lower California, and Rocky Point, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. 2-26 fathoms. (Garth, 1958).

**Material Examined.**—Twenty-five specimens from two stations:

**El Salvador**

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 3 males, 6 females (4 ovigerous).

**Costa Rica**

Cedro Island, Gulf of Nicoya, Station 213, D-1 to D-10, 4-10 fathoms, 10 males, 6 females (3 ovigerous).

**Measurements.**—Males, 4.0 to 10.0 mm., females, 4.8 to 7.1 mm., ovigerous females, 5.1 to 7.1 mm.

**Color in Life.**—Very variable. Young female entirely brownish-gray, speckled on carapace and chelipeds with medium brown. Ovigerous female with orange eggs similarly marked, but with white longitudinal streaks on carapace, and posterior part of carapace cream. Chelipeds broadly banded with brown and speckled brownish-gray and pure cream. Young male almost all buffy with gastric and anterolateral regions alone speckled and dark in the usual way; chelipeds buff. (Crane, field notes).

**Habitat.**—Mud; shelly mud. The broken bold markings make the crabs look like a group of broken shells exactly matching the bottom.

**Remarks.**—Crane (in field notes) suggests that the broken markings are a holdover from a shallow-water adaptation, not now of much use to the crabs because of the dark environment in which they are found.

***Heterocrypta craneae*, new species**

(Plate 1)

**Type.**—Female holotype, A.H.F. No. 376, and female paratype, N.Y.Z.S. No. 37,708, from La Unión, Gulf of Fonseca, El Salvador, December 27, 1937, "Zaca" Station 199, D-8, 6 fathoms, mud and mangrove leaves.

**Measurements.**—Female holotype, length 19.7 mm., width 28.4 mm., front 1.8 mm., width 2.9 mm., fronto-orbit 5.2 mm., major cheliped 35.5 mm., chela 19.6 mm., dactyl 9.5 mm., height of palm 8.0 mm. Female paratype, length 18.4 mm., width 24.5 mm.

**Diagnosis.**—Carapace nearly one and one-half

times as wide as long, margins crenulate. Posterolateral margin between branchial ridge and lateral angle concave. Branchial ridges uniting in paired tubercles defining gastric ridge. Cardiac region high, domed.

*Description*.—Carapace wide, length over two-thirds width, and high, especially gastric and cardiac regions. Branchial ridges paralleling crenulate anterolateral margins except on gastric region, there terminating in two berried tubercles, side by side. From these a longitudinal crest of flattened tubercles running forward to inner margin of orbit. A large, domed elevation surmounting cardiac region; gastric region equally elevated. Surface smooth and punctate, margins crenulate, a closed fissure one-third of the way between outer orbital and lateral angle. Posterolateral margin between lateral angle and branchial ridge deeply indented. Posterior margin concealing legs except for merus of last pair. Rostrum advanced, narrow, sides arcuate, tip triangulate.

Chelipeds unequal, short and heavy as compared to *Heterocrypta macrobrachia* Stimpson, but not as compared to *H. granulata* (Gibbes). Upper surface of manus, but not of merus, dilated at mid-point, margins of both segments and of carpus crenulate. Fingers of major chela gaping broadly at base, lower margin of pollex straight or slightly sinuous, upper margin with a basal ridge and distal tooth; dactylus downcurving, inner margin denticulate, three granulate superior crests. Fingers of minor chela slenderer, deflexed, meeting without a gape, tips crossing. Margins of walking legs minutely denticulate.

External maxillipeds with ischium grooved, merus granulate and punctate, subquadrate emargination at anterointernal angle not completely filled by palp, leaving a small opening.

Female abdomen with a transverse row of granules on segments two and three, sparsely granulate elsewhere, segment seven narrowly triangular. Male of the species unknown.

*Remarks*.—The discovery by the "Zaca" of a new species of *Heterocrypta* from the Gulf of Fonseca calls for a reexamination of the species relationships of this amphi-American genus. Apparently *H. craneae* is the true representative in the eastern Pacific of the short-armed *H. granulata* (Gibbes) of the western Atlantic, from which it differs most conspicuously by its larger size and indented posterolateral margin. According to this analysis, the writer's earlier assignment of *H. colombiana* Garth (1940, p. 72) to the role of Pacific analogue of *H. granulata* was both premature and in error. *H. colombiana*, which reexamination shows to lack ventrally the

granular ridge connecting the anterior corner of the buccal frame with the base of the cheliped, might better have been referred to *Cryptopodia* Milne Edwards.

The two specimens from La Unión are encrusted with a bryozoan identified by Dr. John D. Soule of the Allan Hancock Foundation as *Membranipora savarti* (Audouin, 1826).

I take pleasure in naming this distinctive parthenopid species for Miss Jocelyn Crane, M. Sc., Assistant Director of the Department of Tropical Research of the New York Zoological Society, through whose diligence as a collector and skill as an observer many hitherto obscure facts concerning crabs have been made known.

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## EXPLANATION OF THE PLATE

### PLATE I

#### *Heterocrypta craneae*, new species

- FIG. 1. Female holotype, dorsal view.
- FIG. 2. Female holotype, ventral view. (Carapace and chelipeds heavily encrusted with the bryozoan, *Membranipora savarti*)